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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,223	07/26/2006	Hans-Peter Brack	5026-1001	3418
466 7590 03/04/2010 YOUNG & THOMPSON 209 Madison Street Suite 500 Alexandria, VA 22314				
EXAMINER MICALL JOSEPH				
ART UNIT 1793		PAPER NUMBER		
NOTIFICATION DATE 03/04/2010		DELIVERY MODE ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketingDept@young-thompson.com

Office Action Summary

Application No.

10/577,223

Applicant(s)

BRACK ET AL.

Examiner

Joseph V. Micali

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 12th, 2010 has been entered.

Status of Application

The amendments and argumentation filed on February 12th, 2010 have been entered. Claims 13-36 are pending and presented for examination on the merits, as claims 1-12 have been cancelled. The previous claim objection has been removed as per applicant's amendment.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 13, 21-22, 25-27, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 4,605,685 by Momose et al, in view of US Patent Pub. No. 2003/0054219 by Won et al and US Patent Pub. No. 2004/0106044 by Kerres.

With respect to independent claims 13 and 21, Momose discloses a method for preparing a membrane to be assembled in a membrane electrode assembly, comprising the step of swelling an ion-conducting membrane, such as Nafion®, in a liquid containing at least one solvent by controlling the content of solvent in the ion-conducting membrane (**example 1 and column 5, lines 35-50**).

Momose is silent with regards to drying the membrane after the swelling step, and subsequently re-swelling the membrane by immersing in a solvent, such as water as shown in the specification.

Won is drawn to proton exchange composite membranes and methods for manufacturing fuel cells using the same (**title**). Specifically, Won discloses preparing an ion-exchange membrane by swelling in a suitable solvent several times, and subsequently drying and re-swelling in deionized water (**paragraph 0032**).

At the time of invention it would have been obvious to a person of ordinary skill in the art to perform the process of Momose including drying and re-swelling of the membrane, in view of the teaching of Won. The suggestion or motivation for doing so would have been to prepare the membrane in final product form by removing the suspending solvents (**Won, paragraph 0032**).

Furthermore, with respect to independent claim 21, Momose discloses a method comprising the steps of providing a membrane in a pre-swollen state, coating the membrane on both sides with an electrode layer to form a sandwich and hot-pressing the sandwich (**column 5, line 35 – column 6, line 12**).

Finally, however, with regards to the newly added limitations, the combination of Momose and Won is silent with regards to the drying step being conducted at an elevated temperature in the range of 100 to 140° C.

Kerres is drawn to the production of polymer membranes (**title**), such as those systems including Nafion® (**paragraphs 0009-0011**). Specifically, Kerres discloses a method in which an ion-conducting membrane is subjected to a swelling step, subsequently dried at a temperature of 100° C to remove the solvent, and finally re-swelled (**paragraph 0047**).

At the time of invention it would have been obvious to a person of ordinary skill in the art to perform the modified process of Momose including a drying step at an elevated temperature of 100° C, in view of the teaching of Kerres. The suggestion or motivation for doing so would have been to employ improved means for the removal of the solvent from the membrane (**Kerres, paragraph 0047**).

With respect to claim 22, Momose discloses a catalytic active layer disposed between the electrode layer and the membrane (**column 5, line 66 – column 6, line 12**).

With respect to claim 25, Momose discloses a catalytic active layer comprising ruthenium (**column 5, line 67-68**).

With respect to claim 26, Momose discloses the production of such a membrane electrode assembly (**column 5, line 35 – column 6, line 12**).

With respect to claims 27 and 34, Momose discloses a membrane having a thickness in the range of 100 microns (**column 5, line 35**).

5. Claims 14-16, 18-19, 29-31, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 4,605,685 by Momose et al, in view of US Patent Pub. No. 2003/0054219 by Won et al and US Patent Pub. No. 2004/0106044 by Kerres, as applied to claims 13, 21-22, 25-27, and 34 above, and further in view of US Patent No. 5,656,386 by Scherer et al.

With respect to claim 14, Momose, as combined, is silent as to the membrane being a radiation grafted membrane.

Scherer is drawn to an electrochemical cell, such as a fuel cell. Specifically, Scherer teaches that the membrane between electrodes of the cell is a radiation grafted membrane (**abstract, and column 4, line 27 – column 5, line 5**).

At the time of invention it would have been obvious to a person of ordinary skill in the art to perform the modified process of Momose including employment of a radiation grafted membrane, in view of the teaching of Scherer. The suggestion or motivation for doing so would have been to produce a membrane with long-term stability (**Scherer, column 3, lines 17-28**).

With respect to claims 15 and 29, Scherer teaches a graft level ranging from 10-40% (**Examples 1-15**).

With respect to claims 16, 19, 31, and 36, Scherer teaches a crosslinker monomer, such as divinylbenzene, in the grafting solution at around 10-17% as relative to styrene (**Examples 9 and 14**).

With respect to claims 18 and 30, Scherer teaches the membrane being coated, specifically impregnated, with an ionically conducting polymeric phase, such as Nafion® (**column 3, lines 40-45, and Example 20**).

6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 4,605,685 by Momose et al, in view of US Patent Pub. No. 2003/0054219 by Won et al and US Patent Pub. No. 2004/0106044 by Kerres, as applied to claims 13, 21-22, 25-27, and 34 above, and further in view of US Patent Pub. No. 2004/0062970 by Nomura.

With respect to claim 17, Momose discloses a method characterized in that prior to the swelling step, the membrane is treated in a strong acid solution and then rinsed with water (**column 7, lines 38-45**). Though Momose teaches these steps, Momose does not specify the time period for treating with a strong acid solution.

Nomura is drawn to the production of a proton-conducting membrane and fuel cells made by using the same (**title**). Specifically, Nomura discloses treating the membrane with a strong acid, such as sulfuric acid, for a time of 1 hour, or 60 minutes (**paragraph 0329**).

At the time of invention it would have been obvious to a person of ordinary skill in the art to perform the modified process of Momose including treatment of the membrane in strong acid for a period between 10 and 120 minutes, in view of the teaching of Nomura. The suggestion or motivation for doing so would have been to supply an art-accepted time period for strong acid

treatment of a membrane, as Momose is silent to specific time duration (**Nomura, paragraph 0329**).

Furthermore, **MPEP 2144.05 [R-5]** states that, "Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'"

7. Claims 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 4,605,685 by Momose et al, in view of US Patent Pub. No. 2003/0054219 by Won et al, US Patent Pub. No. 2004/0106044 by Kerres and US Patent No. 5,656,386 by Scherer et al, as applied to claims 14-16, 18-19, 29-31, and 36 above, and further in view of US Patent Pub. No. 2004/0062970 by Nomura.

With respect to claim 20, Momose discloses a method characterized in that prior to the swelling step, the membrane is treated in a strong acid solution and then rinsed with water (**column 7, lines 38-45**). Though Momose teaches these steps, Momose does not specify the time period for treating with a strong acid solution.

Nomura is drawn to the production of a proton-conducting membrane and fuel cells made by using the same (**title**). Specifically, Nomura discloses treating the membrane with a strong acid, such as sulfuric acid, for a time of 1 hour, or 60 minutes (**paragraph 0329**).

At the time of invention it would have been obvious to a person of ordinary skill in the art to perform the modified process of Momose including treatment of the membrane in strong acid for a period between 10 and 120 minutes, in view of the teaching of Nomura. The suggestion or

motivation for doing so would have been to supply an art-accepted time period for strong acid treatment of a membrane, as Momose is silent to specific time duration (**Nomura, paragraph 0329**).

Furthermore, **MPEP 2144.05 [R-5]** states that, “Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. ‘[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.’”

8. Claims 23-24, 28, 32-33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 4,605,685 by Momose et al, in view of US Patent Pub. No. 2003/0054219 by Won et al and US Patent Pub. No. 2004/0106044 by Kerres, as applied to claims 13, 21-22, 25-27, and 34 above, and further in view of US Patent Pub. No. 2004/0115499 by Tani et al.

With respect to claims 23, 28, 32, and 35, Momose, as combined, is silent on the electrode layer being selected from carbon cloth, carbon paper, or carbon felt.

Tani is drawn to a method for producing membrane-electrode structures. Specifically, Tani teaches the use of carbon paper being an electrode layer applied in the form of a hydrophilic slurry, which is then hot pressed to produce a membrane-electrode structure (**paragraphs 0072-0073**).

At the time of invention it would have been obvious to a person of ordinary skill in the art to perform the modified process of Momose including employment of carbon paper, in view of

the teaching of Tani. The suggestion or motivation for doing so would have been to supply a carbon substrate for use as an electrode layer (**Tani, paragraphs 0070 and 0072-0073**).

With respect to claim 24 and 33, Tani teaches hot pressing conditions being at a temperature of 80-140° C, a pressure of 1-5 MPa, and a duration of 2-10 minutes (or 120-600 seconds) (**paragraph 0073**). **MPEP 2144.05 [R-5]** states that, "In the case where the claimed ranges 'overlap or lie inside ranges disclosed by the prior art' a *prima facie* case of obviousness exists."

Response to Arguments

9. Applicant's arguments with respect to the current claim set have been considered but are moot in view of the new ground(s) of rejection.

With respect to applicant's outstanding argumentation, such argumentation is no longer persuasive, as it is based on the newly added limitations which have now been addressed by the examiner-cited Kerres reference. The newly added limitations were related to the specifics of the drying step, such as it being at an elevated temperature in the range of 100-140° C. The previous prior art of record did not specify such a drying temperature. Examiner was required to continue search and consideration, and found the reference of Kerres which discloses subjecting an ion-conducting membrane to a swelling step with subsequent drying conducted at a temperature of 100° C to remove the solvent. As all argumentation was based on such an issue and no other issues with the prior art of record, applicant's argumentation on the whole is not persuasive, given the new reference of Kerres and the newly amended claim rejections.

Conclusion

10. Claims 13-36 are rejected.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph V. Micali whose telephone number is (571) 270-5906.

The examiner can normally be reached on Monday through Friday, 7:30am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry A. Lorengo can be reached on (571) 272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph V Micali/
Examiner, Art Unit 1793

/J.A. LORENZO/
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